

PL 1183105

REC'D 21 JUN 2004

WIPO

PCT

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

June 16, 2004

THIS IS TO CERTIFY THAT ANNEXED HERETO IS A TRUE COPY FROM THE RECORDS OF THE UNITED STATES PATENT AND TRADEMARK OFFICE OF THOSE PAPERS OF THE BELOW IDENTIFIED PATENT APPLICATION THAT MET THE REQUIREMENTS TO BE GRANTED A FILING DATE.

APPLICATION NUMBER: 10/428,035

FILING DATE: May 02, 2003

RELATED PCT APPLICATION NUMBER: PCT/US04/13593

By Authority of the
COMMISSIONER OF PATENTS AND TRADEMARKS



N. Woodson
N. WOODSON
Certifying Officer

**PRIORITY
DOCUMENT**
SUBMITTED OR TRANSMITTED IN
COMPLIANCE WITH RULE 17.1(a) OR (b)

BEST AVAILABLE COPY

Please type a plus sign (+) inside this box → ☐

10428035 . 050203

PTO/SB/05 Revised (11-00)

**UTILITY
PATENT APPLICATION
TRANSMITTAL**

(Only for new nonprovisional applications under 37 C.F.R. 1.53(b))

Attorney Docket No. 29953-183843

First Inventor Sheldon YOURIST

Title METHOD AND APPARATUS FOR CREATING TEXTURED HANDLE
PACKAGING

Express Mail Label No.

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

1. ☒ Fee Transmittal Form (e.g., PTO/SB/17)
(Submit an original and a duplicate for fee processing)
2. ☐ Applicant claims small entity status.
See 37 CFR 1.27.
3. ☒ Specification (Total Pages **15**)
(preferred arrangement set forth below)
- Descriptive title of the Invention
 - Cross References to Related Applications
 - Statement Regarding Fed sponsored R & D
 - Reference to sequence listing, a table, or a computer program listing appendix
 - Background of the Invention
 - Brief Summary of the Invention
 - Brief Description of the Drawings (if filed)
 - Detailed Description
 - Claim(s)
 - Abstract of the Disclosure
4. ☒ Drawing(s) (35 U.S.C. 113) (Total Sheets **18**)
5. Oath or Declaration (Total Pages ☐)
- a. ☐ Newly executed (original or copy)
- b. ☐ Copy from a prior application (37 CFR 1.63 (d))
(for a continuation/divisional with Box 18 completed)
- i. ☐ **DELETION OF INVENTOR(S)**
Signed statement attached deleting inventor(s)
named in the prior application, see 37 CFR
1.63(d)(2) and 1.33(b).
6. ☒ Application Data Sheet. See 37 CFR 1.76
- 6a. ☐ Priority is claimed under the provisions of 35 U.S.C. § 119
Appln No. _____ filed in _____ on
Appln No. _____ filed in _____ on

ADDRESS TO:Assistant Commissioner for Patents
Box Patent Application
Washington, DC 20231

7. ☐ CD-ROM or CD-R in duplicate, large table or
Computer Program (Appendix)
8. Nucleotide and/or Amino Acid Sequence Submission
(if applicable, all necessary)
- a. ☐ Computer Readable Form (CRF)
- b. Specification Sequence Listing on:
i. ☐ CD-ROM or CD-R (2 copies); or
ii. ☐ paper
- c. ☐ Statements verifying identity of above copies

ACCOMPANYING APPLICATIONS PARTS

9. ☐ Assignment Papers (cover sheet & document(s))
10. ☐ 37 C.F.R. §3.73(b) Statement ☐ Power of
(when there is an assignee) Attorney
11. ☐ English Translation Document (if applicable)
12. ☐ Information Disclosure ☐ Copies of IDS
Statement (IDS)/PTO-1449 Citations
13. ☐ Preliminary Amendment
14. ☒ Return Receipt Postcard (MPEP 503)
(Should be specifically itemized)
15. ☐ Certified Copy of Priority Document(s)
(if foreign priority is claimed)
16. ☐ Request and Certification under 35 U.S.C. 122
(b)(2)(B)(i). Applicant must attach form PTO/SB/35
or its equivalent.
17. ☐ Other:

18. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment,
or in an Application Data Sheet under 37 CFR 1.76:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP)

of prior application No: _____ /

Prior application information: Examiner _____

Group / Art Unit:

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied
under Box 5b, is considered a part of the disclosure of the accompanying or divisional application and is hereby incorporated by reference.
The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

20. CORRESPONDENCE ADDRESS☒ Customer Number or Bar Code Label

26694

PATENT TRADEMARK OFFICE

or ☐ Correspondence address below

| | | | | | | |
|---------|----------------|-----------|--------------|----------|--------------|--|
| Name | VENABLE | | | | | |
| Address | P.O. Box 34385 | | | | | |
| City | Washington | State | D.C. | Zip Code | 20043-9998 | |
| Country | U.S.A. | Telephone | 202-962-4800 | Fax | 202-962-8300 | |

| | | | |
|-------------------|-------------------|-----------------------------------|--------|
| Name (Print/Type) | Keith G. Haddaway | Registration No. (Attorney/Agent) | 46,180 |
| Signature | | Date | 5/2/03 |

#454188 v1 - Graham Transmittal sheet re METHOD & APPARATUS FOR CREATING TEXTURED...
PC Docs No. DC2/454188

VENABLE
INNOVATIONS AT 600

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

FEE TRANSMITTAL for FY 2003

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT (\$) 1062

Complete If Known

| | |
|----------------------|-----------------|
| Application Number | To be assigned |
| Filing Date | May 2, 2003 |
| First Named Inventor | Sheldon YOURIST |
| Examiner Name | |
| Group / Art Unit | |
| Attorney Docket No. | 29953-183843 |

METHOD OF PAYMENT (check all that apply)

☒ Check ☐ Credit card ☐ Money ☐ Other ☐ None
Order

☒ Deposit Account:

Deposit
Account
Number
Deposit
Account
Name

22-0261

VENABLE ATTORNEYS AT LAW

The Commissioner is authorized to: (check all that apply)

☐ Charge fee(s) indicated below ☒ Credit any overpayments
☒ Charge any additional fee(s) under 1.16 or 1.17 during pendency of this application
☐ Charge fee(s) indicated below, except for the filing fee to the above-identified deposit account.

FEE CALCULATION

1. BASIC FILING FEE

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|------------------------|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1001 | 750 | 2001 | 375 | Utility filing fee | 750 |
| 1002 | 330 | 2002 | 165 | Design filing fee | |
| 1003 | 520 | 2003 | 260 | Plant filing fee | |
| 1004 | 750 | 2004 | 375 | Reissue filing fee | |
| 1005 | 160 | 2005 | 80 | Provisional filing fee | |
| SUBTOTAL (1) | | | | | (\$ 750) |

2. EXTRA CLAIM FEES

| | | | | | | | | | | | |
|--------------------|----|--------|---|---|--------------|----------------|---|----|---|-----|----------|
| Total Claims | 28 | -20 ** | = | 8 | Extra Claims | Fee from below | X | 18 | = | 144 | Fee Paid |
| Independent Claims | 5 | -3 ** | = | 2 | Extra Claims | Fee from below | X | 84 | = | 168 | Fee Paid |
| Multiple Dependent | | | | | Extra Claims | Fee from below | X | | = | 0 | Fee Paid |

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|--|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1202 | 18 | 2202 | 9 | Claims in excess of 20 | |
| 1201 | 84 | 2201 | 42 | Independent claims in excess of 3 | |
| 1203 | 280 | 2203 | 140 | Multiple dependent claim, if not paid | |
| 1204 | 84 | 2204 | 42 | ** Reissue independent claims over original patent | |
| 1205 | 18 | 2205 | 9 | ** Reissue claims in excess of 20 and over original patent | |
| SUBTOTAL (2) | | | | | (\$ 312) |

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

| Large Entity | | Small Entity | | Fee Description | Fee Paid |
|--------------|----------|--------------|----------|--|----------|
| Fee Code | Fee (\$) | Fee Code | Fee (\$) | | |
| 1051 | 130 | 2051 | 65 | Surcharge - late filing fee or oath | |
| 1052 | 50 | 2052 | 25 | Surcharge - late provisional filing fee or cover sheet | |
| 1053 | 130 | 1053 | 130 | Non-English specification | |
| 1812 | 2,520 | 1812 | 2,520 | For filing request for ex parte reexam | |
| 1804 | 920* | 1804 | 920* | Requesting publication of SIR prior to Examiner action | |
| 1805 | 1,840* | 1805 | 1,840* | Requesting publication of SIR after Examiner action | |
| 1251 | 110 | 2251 | 55 | Extension for reply within first month | |
| 1252 | 410 | 2252 | 205 | Extension for reply within second month | |
| 1253 | 930 | 2253 | 465 | Extension for reply within third month | |
| 1254 | 1,450 | 2254 | 725 | Extension for reply within fourth month | |
| 1255 | 1,970 | 2255 | 985 | Extension for reply within fifth month | |
| 1401 | 320 | 2401 | 160 | Notice of Appeal | |
| 1402 | 320 | 2402 | 160 | Filing a brief in support of an appeal | |
| 1403 | 280 | 2403 | 140 | Request for oral hearing | |
| 1451 | 1,510 | 1451 | 1,510 | Petition to institute a public use proceeding | |
| 1452 | 110 | 2452 | 55 | Petition to revive - unavoidable | |
| 1453 | 1,300 | 2453 | 650 | Petition to revive - unintentional | |
| 1501 | 1,300 | 2501 | 650 | Utility issue fee (or reissue) | |
| 1502 | 470 | 2502 | 235 | Design issue fee | |
| 1503 | 630 | 2503 | 315 | Plant issue fee | |
| 1460 | 130 | 1460 | 130 | Petitions to the Commissioner | |
| 1807 | 50 | 1807 | 50 | Processing fee under 37 CFR 1.17 (q) | |
| 1806 | 180 | 1806 | 180 | Submission of Information Disclosure Stmt | |
| 8021 | 40 | 8021 | 40 | Recording each patent assignment per property (times number of properties) | |
| 1809 | 760 | 2809 | 375 | Filing a submission after final rejection (37 CFR § 1.129(a)) | |
| 1810 | 750 | 2810 | 375 | For each additional invention to be examined (37 CFR § 1.129(b)) | |
| 1801 | 750 | 2801 | 375 | Request for Continued Examination (RCE) | |
| 1802 | 900 | 1802 | 900 | Request for expedited examination of a design application | |

Other fee (specify)

*Reduced by Basic Filing Fee Paid

SUBTOTAL (3)

(\$ 0)

SUBMITTED BY

| | | | | | |
|-------------------|-------------------|---------------------------------|--------|-----------|--------------|
| Name (Print/Type) | Keith G. Handaway | Registration No. Attorney/Agent | 46,180 | Telephone | 202-852-4800 |
| Signature | | Date | 5/2/03 | | |

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.
SEND TO: Commissioner for Patents, Washington, DC 20231.

VENABLE
ATTORNEYS AT LAW

PC Docs No. DC2/454185

APPLICATION DATA SHEET**Application Information**

Application Number:: To be assigned
Filing Date:: May 2, 2003
Application Type:: Regular
Subject Matter:: Utility
Suggested Classification::
Suggested Group Art Unit::
CD-ROM or CD-R?::
Number of CD Disks::
Number of Copies of CDs::
Sequence Submission?::
Computer Readable Form (CFR)?::
Number of Copies of CFR::
Title:: METHOD AND APPARATUS FOR CREATING
TEXTURED HANDLE PACKAGING
Attorney Docket Number:: 29953-184843
Request for Early Publication?::
Request for Non-Publication?::
Suggested Drawing Figure:: 18
Total Drawing Sheets:: 18
Small Entity?:: No
Latin Name::
Variety Denomination Name::
Petition Included?::
Petition Type::
Licensed US Govt. Agency::
Contract or Grant Numbers::
Secrecy Order in Parent Appl.::

Applicant Information

Applicant Authority Type:: Inventor
Primary Citizenship:: Korea
Country:: Korea
Status:: Full Capacity
Given Name:: Seungyeol
Middle Name::
Family Name:: Hong
Name Suffix::
City of Residence:: Plainfield
State or Province of Residence:: Illinois
Country of Residence:: USA
Street of Mailing Address:: 6205 S. Ridge Road
City of Mailing Address:: Plainfield
State or Province of Mailing Address:: Illinois
Country of Mailing Address:: USA
Postal or Zip Code of Mailing Address:: 60544

Applicant Authority Type:: Inventor
Primary Citizenship:: USA
Country:: USA
Status:: Full Capacity
Given Name:: Sheldon
Middle Name::
Family Name:: Yourist
Name Suffix::
City of Residence:: York
State or Province of Residence:: Pennsylvania
Country of Residence:: USA

Street of Mailing Address:: 350 Wire Road
City of Mailing Address:: York
State or Province of Mailing Address:: Pennsylvania
Country of Mailing Address:: USA
Postal or Zip Code of Mailing Address:: 17402

Correspondence Information

Correspondence Customer Number:: 26694
Phone Number:: 202-962-4800
Fax Number:: (202) 962-8300
E-Mail Address:: kghaddaway@venable.com

Representative Information

Representative Customer Number:: 26694

Domestic Priority Information

| Application:: | Continuity Type:: | Parent Application:: | Parent Filing Date:: |
|---------------|-------------------|----------------------|----------------------|
| | Continuation of | | |
| | Continuation of | | |
| | Continuation of | | |
| | Continuation of | | |

सुविधा के लिए प्रार्थना है।

| Country:: | Application Number:: | Filing Date:: | Priority Claimed:: |
|-----------|----------------------|---------------|--------------------|
| | | | |
| | | | |
| | | | |

Assignee Information

| | |
|--|---------------------------------------|
| Assignee Name:: | Graham Packaging Company, L.P. |
| Street of Mailing Address:: | 2401 Pleasant Valley Road |
| City of Mailing Address:: | York |
| State or Province of Mailing Address:: | Pennsylvania |
| Country of Mailing Address:: | U.S.A. |
| Postal or Zip Code of Mailing Address:: | 17402 |

**METHOD AND APPARATUS FOR CREATING TEXTURED HANDLE
PACKAGING**

BACKGROUND OF THE INVENTION

Field of the Invention

[0001] The present invention relates to a method for designing a container, specifically a container comprising a handle and a sidewall, and more specifically to a container having a three-dimensional image, the image of a fruit tree leaf, for example, applied on the handle and sidewall of the container, the handle creating a hole between itself and the sidewall of the container.

Description of the Related Art

[0002] Blow-molded plastic containers have become commonplace in packaging products using hot-fill and cold-fill processes such as beverages including juice, for example. Such a container normally has a dome, an annular sidewall extending from a base, and a waist connecting the dome to the sidewall. Typically, the containers have a horizontal cross section which is circular, rectangular or multi-faceted. Blow-molded plastic containers can provide a package with sufficient flexure to compensate for pressure and temperature, while maintaining structural integrity and aesthetic appearance. In addition, the plastic used in the containers is recyclable. In order to increase the sales of beverages or other products, there is a need to produce aesthetically appealing containers.

[0003] Other containers, particularly those designed for larger volumes of liquids, can have a more rectangular cross-section. Such containers frequently have a handle molded into the container to make it easier to lift and to pour the contents from the container. These containers are also generally blow-molded by, for example, stretch blow-molding, extrusion blow-molding, and injection blow-molding. It is often desirable to place designs or a relief on a container for either functional reasons, such as to improve gripability, or ornamental reasons, for example by placement of a logo or some other means that promotes "brand identity."

[0004] Making molds that create relief structures on containers is known. However, prior art mold-making methods are limited by how the designs are created and the intricacies of the

mold-making process. Generally, these prior art methods have limited the scope of designs that can be created and the placement of designs. As a result of these limitations, designs are generally placed in relatively open spaces on a container. These open spaces can be, for example, on the dome of a round container or a flat surface of a rectangular container.

[0005] An example of a typical prior art method is a means for making a mold to create a sculpture to appear on a container. As shown in Figure 1, a design is placed on an electrode attached to a rod. The electrode 1, heated with an electric current, is applied to a mold to leave a negative relief impression of the design on the mold. Thereafter, the mold is assembled to form a mold cavity. This method is useful for placing designs on a container dome or flat, open surface of a rectangular container. One drawback of this technique is that it can result in formation of a defective sculpture by misapplication of the electrode 1 to the mold. For example, the electrode 1 may be impressed too far against the mold leaving unwanted marks on the mold, which appear on the container, or the electrode 1 may not be pressed far enough against the mold leaving a poor impression of the design on the container. As the number of desired sculptures on a container increases, the number of possible sculptural defects increases. Since both defects occur due to variances in machine tolerances during the process of impressing the prior art electrode onto the mold, there is a need for a new method for creating sculptures on containers efficiently, quickly, repeatedly, at a low cost, and with a minimum of defects.

BRIEF SUMMARY OF THE INVENTION

[0006] The above-mentioned disadvantages are overcome by a method in a computer system for generating an image for producing an electrode as disclosed in co-pending U.S. Patent Application No. 60/384,166 to Yourist filed May 31, 2002, which is incorporated herein by reference in its entirety. As disclosed therein, such a method may comprise the steps of: generating a virtual sculptural relief; projecting the virtual sculptural relief onto a virtual mold cavity surface to form a virtual sculptural relief on the virtual mold cavity surface, the projected virtual sculptural relief having a profile; removing the virtual mold cavity surface outside the profile of the virtual projected sculptural relief; extending the virtual projected sculptural relief profile to a predetermined plane to form a virtual extension of the virtual projected sculptural relief; and combining the virtual projected sculptural relief with the

angle. The angle at which the image is applied may be such that the image is applied to multiple surfaces of the handle and the sidewall of the container simultaneously.

[0009] The image to be manipulated and applied may be generated in a method similar to that described in U.S. Patent Application No. 60/384,166.

BRIEF DESCRIPTION OF THE DRAWINGS

- [00010] FIG. 1 shows a rod attached to an electrode created in accordance with the prior art;
- [00011] FIG. 2a shows an exemplary non-round container;
- [00012] FIG. 2b shows an exemplary cylindrical container;
- [00013] FIG. 3 is an example of a workstation utilized to implement the present invention;
- [00014] FIG. 4 is a flow chart showing a method of the present invention according to an exemplary embodiment thereof;
- [00015] FIG. 5 is an exemplary two-dimensional, flat image to appear on the container;
- [00016] FIGS. 6-9 are exemplary three-dimensional sculptural reliefs formed from the two-dimensional, flat image shown in FIG. 5;
- [00017] FIGS 10-14 illustrate the sculptural image of FIGS. 6-9 projected onto a container and being manipulated to fit the container surface;
- [00018] FIGS 15-17 show the simulated mold cavity surface outside boundary of the projected sculptural relief being trimmed away; and
- [00019] FIG. 18 shows a container comprising a handle and a sidewall having a three-dimensional textured image applied thereon according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

- [00020] A computer system can be used to design a relief, a container, or place a relief design on a container. In a typical use of such systems, a design is placed on a container in an open region of the container. Figure 2a shows an exemplary non-round container 200. Open areas in such a container include the relatively open sidewall 202, endwall 204, and dome 206 regions. In a cylindrical container, as shown in Figure 2b, open areas include the dome 208 and sidewall 210 regions. Designing a container with a relief in non-open regions of the

container is more difficult than placing a relief on an open region. As used herein, non-open regions are those that have multiple surfaces meeting at a variety of angles. With reference to Figure 2a, non-open regions include, for example, the handle 212, interior handle surface 214, and the container wall underlying the handle 216.

[00021] Forming a continuous design on such a surface using prior art techniques is difficult. Preparing a mold for such a container using prior art techniques would require burning the design into a mold using multiple electrodes that approach at multiple angles including, for example, an oblique angle (i.e., an angle other than a right angle). Aligning such multiple electrodes to prepare a continuous design using such conventional techniques is a tedious and time-consuming task. For example, failure to properly align the electrodes would result in unacceptable design discontinuities. Alternatively, such molds could be hand-tooled. This, however, adds undesirable time and expense to the mold-making process. The present invention uses design software and automated tooling software to (a) generate a design, and (b) make a mold from the design.

[00022] Figure 3 shows a block diagram of a workstation 20 coupled to a network 10, which provides an example of a computer system, that may be used to implement the invention. The network 10 and the components interfacing with the network are optional parts of the computer system. Workstation 20 includes one or more processors 100 coupled to a bus 105. The bus 105 can be coupled to any of various subsystems including, for example: a temporary memory 110; a secondary memory 112 such as, a disk 114, and/or a removable storage drive 116 into which media 118 can be placed including, e.g., a diskette, a compact diskette (e.g. CD ROM) or the like; an input device such as a mouse 120, or a keyboard 125; an output device such as a display 130 or printer 135; and input/output (I/O) devices to a network 10, for example an network interface card (NIC) 140, such as an Ethernet, Token Ring, Smart or Asynchronous Transfer Mode (ATM) card. Other input/output devices may include a modem 145, or other input/output device such as, a wireless interface 150 (e.g. a wireless transceiver). It will be apparent to those skilled in the relevant art that the above-described workstation 20 has been provided as an example and is not intended to limit the breadth of the invention in any way. The software performing the method steps may be stored on any storage medium, which can be accessed by the workstation 20.

[00023] Although it is preferable that all of the images shown in Figures 5-17 be displayed on the display 130, it is understood that displaying each and every step is not necessary. It is

further understood that the sculpture shown in the figures is only intended as an example.

The designer may design any sculpture. Moreover, the designed electrode may be applied to any mold for any mold process. A dome shaped mold used in a blow-molding process is just one embodiment.

[00024] Figure 4 is a flow chart showing an exemplary embodiment of the present invention. Exemplary illustrations of the method steps in the flow chart of Figure 4 are shown in Figures 5-17. A designer may begin forming the design by generating a two-dimensional, flat image or shape of the artwork, which he or she wishes to appear on the container (step 400). An exemplary view of such an image is shown in Figure 5. As illustrated in Figure 5, the exemplary two-dimensional image 500 may be created with a hole 502 corresponding to the space between the handle 212 and the sidewall 202 of the container 200 to which the design is to be applied. Any other desired features or irregularities can be similarly incorporated into the desired design. In a step for forming a sculptural relief image (step 402), as seen in the exemplary illustration of Figures 6-9, the two-dimensional flat image 500 is transformed into a two-dimensional relief image 600. As shown in Figures 6-9, three-dimensional relief image 600 maintains hole 502 of two-dimensional image 500. The relief image 600 is designed in three dimensions with a particular relief geometry in mind in order to be compatible with the angular aspects of the container. Compare Figures 5-6. However, until the image is projected onto a container and suitably manipulated, it can not be used to create a mold. As shown in Figures 10-14, relief image 600 may be manipulated by, for example, rotating, stretching, or bending the relief image to a position suitable for projecting onto a virtual container.

[00025] Steps 400 and 402 may be implemented using commercial software packages such as, for example, ArtCam sold by Delcam plc of Birmingham, England. A sculptural relief is a three-dimensional image formed in an otherwise planar surface. A sculptural relief may be either positive (protruding from the plane toward an observer) or negative (receding from the plane relative to the observer). Figures 6-9 are examples of a positive sculptural relief image 600 formed from a two-dimensional, flat image 500 such as the one shown in Figure 5, for example. Alternatively, sculptural relief image 600 may be created without referencing a two-dimensional image (step 402). Sculptural relief image 600 is stored in memory as digital data. Sculptural relief image 600 may be stored in a digital file format familiar to a tooling shop such as IGES or STL formats, for example.

[00026] After the sculptural relief image 600 is formed (step 402), the sculptural relief image 600 is projected onto a simulated or "virtual" container surface 1002 (step 404), as shown in Figure 10. For the purposes of this description, simulated container surface means a virtual surface created on the display of the workstation which has a shape corresponding to the shape of the container surface on which the sculptural relief image 600 is to appear. Figures 10-14 show the sculptural relief image projected onto such a virtual surface 1002. The simulated container surface is not limited to being a container handle, but might extend to any scenario involving multiple surfaces with varying angular aspects relative to each other. Thus, the simulated container surface may be any shape onto which incorporation of a particular sculptural relief is desired.

[00027] As illustrated in Figures 10-14, after projecting sculptural relief image 600 onto simulated container surface 1002 (step 404), a method according to the present invention may include manipulation (step 406), including but not limited to resizing and repositioning relief image 600, relative to container surface 1002. Figure 10, for instance, shows an exemplary sculptured relief image 600 which has not yet been manipulated to approximately fit the container. Figure 11 illustrates the exemplary relief after some resizing. Figures 12 to 13 are representations of an exemplary relief which has been resized and rotated enough to almost fit the container, and is being selectively stretched and resized to wrap around the various contours of handle 212 and sidewall 202 of container 200. For example, in progressing from the exemplary structure shown in Figure 12 to the exemplary structure shown in Figure 13, the relief image 600 is selectively extended to wrap into a position corresponding to the contour of the container wall underlying the handle 216. As will be discussed below, Figure 18 shows an exemplary relief which has been fully manipulated to fit the container as designed according to an exemplary embodiment of the present invention.

[00028] After the sculptural relief is projected onto the simulated container surface (step 404), and suitably manipulated, the sculptural relief is preferably triangulated (step 408) to differentiate the surface of the sculptural relief projected onto the simulated container from the simulated container surface, which does not contain the projected surface of the sculptural relief. In effect, a digital data set is formed defining points of the sculptural relief relative to points defining the surrounding simulated container surface. Triangulation of shapes or images is a well known process, which involves using a plurality of triangles in a coordinate

system to define a shape or image. Any other method for ascertaining the surface of the sculptural relief on the simulated mold cavity can be used.

[00029] After the surface of the projected sculptural relief on the simulated container is ascertained, the simulated mold cavity surface outside boundary of the projected sculptural relief image are trimmed away or removed (step 410). Figures 15-17 illustrate an exemplary leaf texture relief image, comparing an exemplary flat relief (a) to an exemplary projected relief (b). The outer boundary of projected sculptural relief image shown in Figures 15-17 determines the profile or outline of the projected sculptural relief image (step 410). Steps 404 through 410 may be performed by commercially available software packages such as CopyCad® by Delcam®. Although these commercial software packages have been previously used to create images for preparing molds having a relief on an open surface of a container, their use in forming images on less open and more intricate surfaces was neither contemplated nor intended. The present invention thus represents a new use that lies outside the original limits of the software.

[00030] The profile (step 410) may provide one or more digital files to a tooling shop in a digital format familiar to the shop such as, for example, IGES or STL files. The digital images created according to the present invention are transformed into images for creating a mold. The tooling shop can then use these files to tool the desired image into the mold. Thus, in contrast to prior art method that impress a design into an existing mold, the present invention uses the combination of design software and tooling software to directly tool a pattern into a mold. Using this combination in this way allows a designer to incorporate features not contemplated nor attainable using prior art methods.

[00031] After the tooling shop has made the mold from an image generated through a method according to the present invention, the mold can be used to make a container having the relief image thereon. The container may be made of a plastic material, such as nylon; polyolefins, such as polypropylene, high density polyethylene and low density polyethylene; and polyesters, such as polyethylene terephthalate, for example. The container may be made according to methods known to those skilled in the art such as injection blow-molding, stretch blow-molding, or extrusion blow-molding, for example.

[00032] Figure 18 shows a container 1800 comprising sidewall 1802 and handle 1804 having a three-dimensional sculptured image 1806 applied thereon according to an exemplary embodiment of the present invention. According to an exemplary embodiment of the present

invention, handle 1804 creates a hole 1808 between itself and sidewall 1802. Because of hole 1808, image 1806 must be applied at an oblique angle in order to be applied to sidewall 1802 and handle 1804 simultaneously.

[00033] While the invention has been described in detail with reference to specific and preferred embodiments, it will be appreciated that various modifications and variations will be apparent to the artisan. All such modifications and embodiments as may occur to one skilled in the art are intended to be within the scope of the appended claims.

CLAIMS

What is claimed is:

1. A method in a computer system for generating an image for producing a design for a container, the method comprising the steps of:
 - generating a virtual sculptural relief design;
 - projecting the virtual sculptural relief onto a virtual container surface, said virtual container surface corresponding to a non-open region of said container;
 - manipulating said relief in three-dimensional space to provide a virtual projected sculptural relief on said non-open region of said virtual container surface; and
 - removing the virtual container surface outside the profile of the virtual projected sculptural relief.
2. The method according to claim 1, further comprising the step of converting the virtual relief into a numerical control language.
3. The method according to claim 1, wherein the step of removing the virtual container surface includes triangulating the virtual projected sculptural relief.
4. The method of claim 3, further comprising the step of displaying a combined triangulated virtual projected sculptural relief and virtual container, which together form an image of a finished container.
5. The method of claim 1, wherein said non-open region comprises a handle region.
6. The method of claim 5, wherein said handle region comprises a handle and an interior handle surface.

7. The method of claim 1, wherein the manipulating step comprises at least one of rotating at least a portion of said virtual relief, extending at least a portion of said virtual relief, contracting at least a portion of said virtual relief, and bending at least a portion of said virtual relief.

8. The method of claim 1, further comprising the step of generating a two-dimensional shape prior to the step of generating the sculptural relief, wherein the sculptural relief is generated from the two-dimensional shape.

9. The method of claim 1, further comprising the step of transferring the design to a machine code suitable for making a mold.

10. A method of making a mold part for a container comprising the steps of:

designing an image for a container including the steps of:

generating a virtual sculptural relief design;

projecting the virtual sculptural relief onto a virtual container surface, said virtual container surface corresponding to a non-open region of said container;

manipulating said relief in three-dimensional space to provide a virtual projected sculptural relief on said non-open region of said virtual container surface; and

removing the virtual container surface outside the profile of the virtual projected sculptural relief; and

tooling a mold for a container having the design.

11. The method of claim 10, further comprising the step of finishing said mold by hand tooling.

12. The method of claim 10, further comprising the step of converting the virtual relief into a numerical control language.

13. The method of claim 12, wherein the numerical control language is a computer file format usable by a tooling shop.
14. The method according to claim 12, further comprising the step of using the numerical control language to machine tool a mold having the sculptural relief designed therein.
15. A computer system for generating an image for producing a design for a container, the computer system comprising:
 - input means for providing a virtual sculptural relief;
 - projecting means for projecting the virtual sculptural relief onto a virtual container surface, said virtual container surface corresponding to a non-open region of said container;
 - manipulating means for manipulating said relief in three-dimensional space to provide a virtual projected sculptural relief on said non-open region of said virtual container surface; and
 - removing means for removing the virtual container surface outside the profile of the virtual projected sculptural relief.
16. The computer system according to claim 15, further comprising displaying means for displaying the combined virtual projected sculptural relief and virtual container.

17. The computer system according to claim 15, further comprising converting means for converting the virtual relief into a numerical control language.

18. The computer system according to claim 17, wherein the numerical control language is a computer file format usable by a tooling shop.

19. The computer system according to claim 17 further comprising inputting numerical data from said converting means into tooling software for making a mold.

20. An computer system for generating an image for producing a design for a container, the computer system comprising:

input means for providing a virtual sculptural relief;

projecting means for projecting the virtual sculptural relief onto a virtual container surface, said virtual container surface corresponding to a non-open region of said container;

displaying means for displaying the virtual sculptural relief and virtual container;

manipulating means for manipulating said relief in three-dimensional space to provide a virtual projected sculptural relief on said non-open region of said virtual container surface; and

removing means for removing the virtual container surface outside the profile of the virtual projected sculptural relief; and

converting means for converting at least one of the virtual sculptural relief and the virtual projected sculptural relief into a numerical control language.

21. A method of making a container with a relief design thereon, the method including the steps of:

designing an image for a container including the steps of:

generating a virtual sculptural relief design;

projecting the virtual sculptural relief onto a virtual container surface,
said virtual container surface corresponding to a non-open region of said
container;

manipulating said relief in three-dimensional space to provide a virtual
projected sculptural relief on said non-open region of said virtual container
surface; and

removing the virtual container surface outside the profile of the virtual
projected sculptural relief;

tooling a mold for a container having the design; and

molding the container in said mold from a material.

22. The method of claim 21, wherein said molding step comprises at least
one of injection blow-molding, stretch blow-molding, and extrusion blow-molding.

23. The method of claim 21, wherein said material is a plastic.

24. The method of claim 23 wherein the plastic is polyethylene terephthalate.

25. The method of claim 23, wherein the plastic is selected from nylon;
polyolefins; and polyesters.

25. The method of claim 25, wherein the polyolefins are selected from
polypropylene, high density polyethylene and low density polyethylene.

26. A container having a relief thereon, said relief designed by the method of
claim 1.

27. A container having a relief thereon, said container made from a mold
prepared according to the method of claim 10.

28. A container having a relief thereon, said container made by the method of
claim 21.

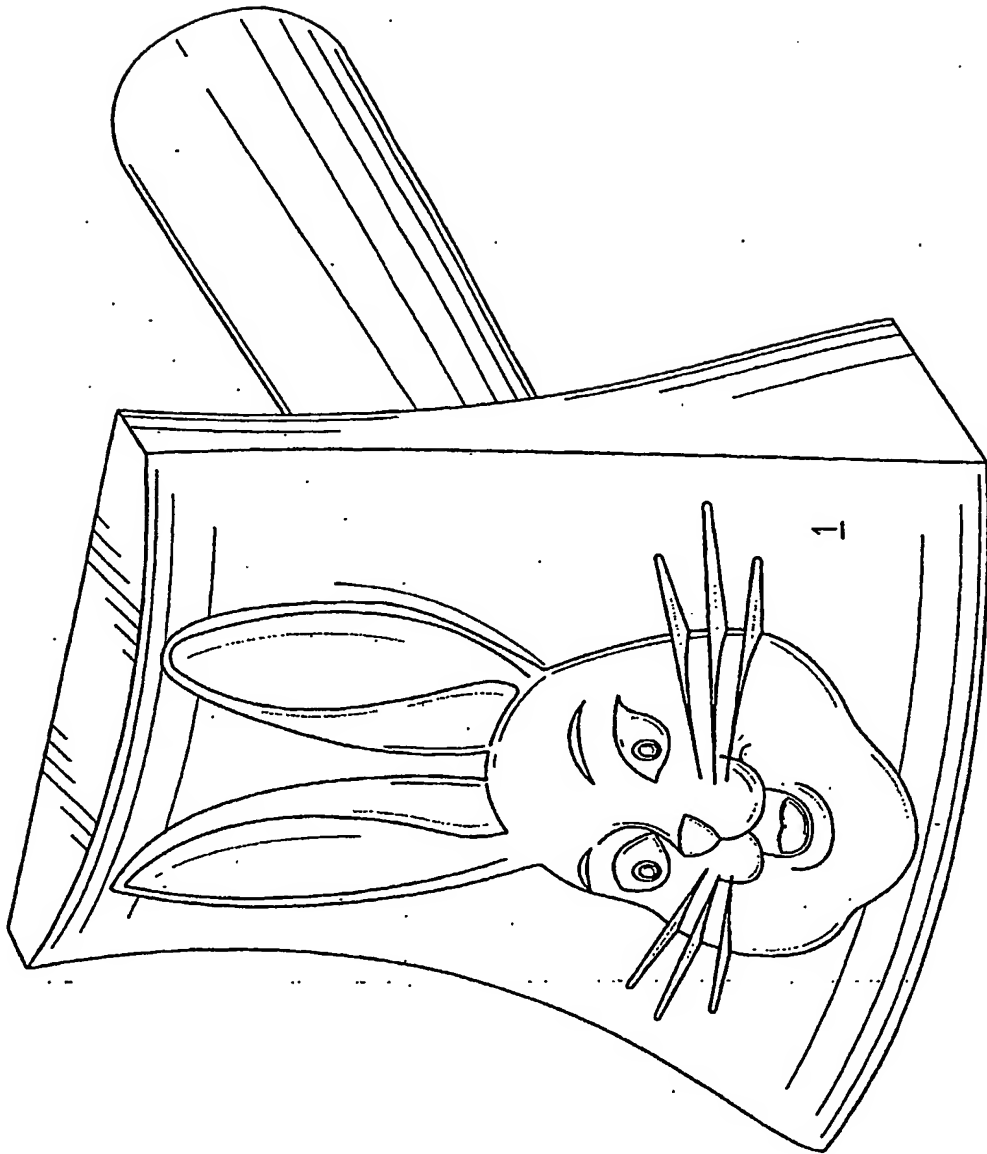


FIG. 1
(PRIOR ART)

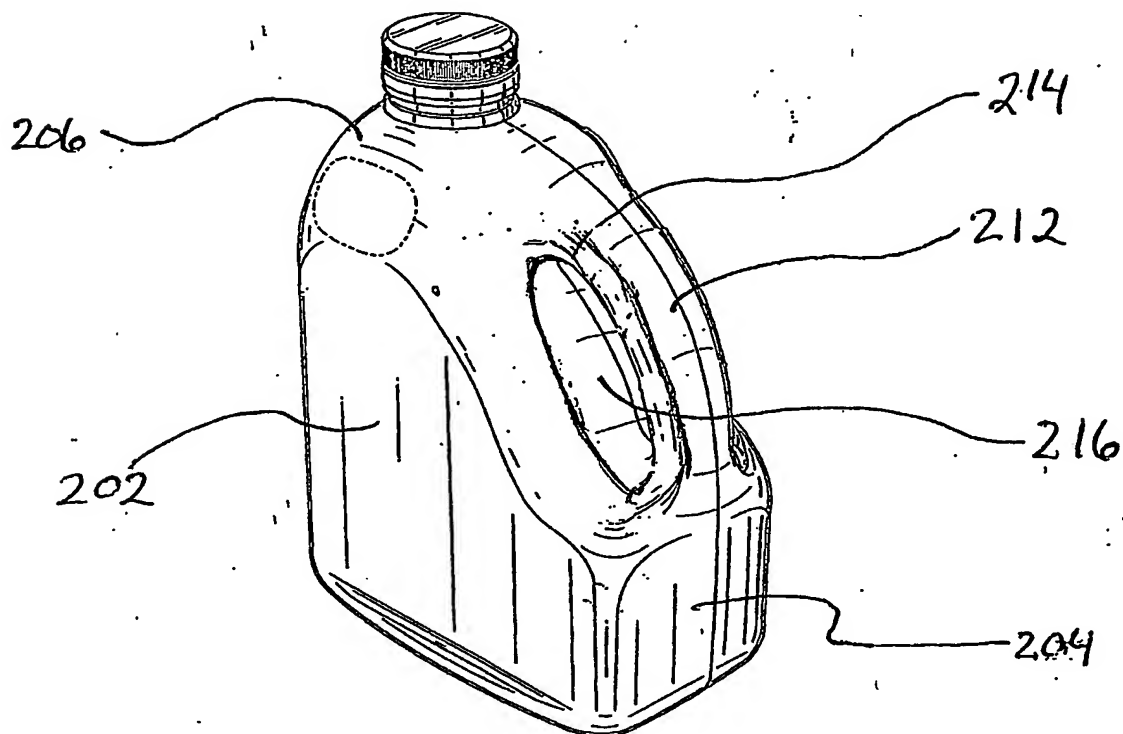


FIG. 2A

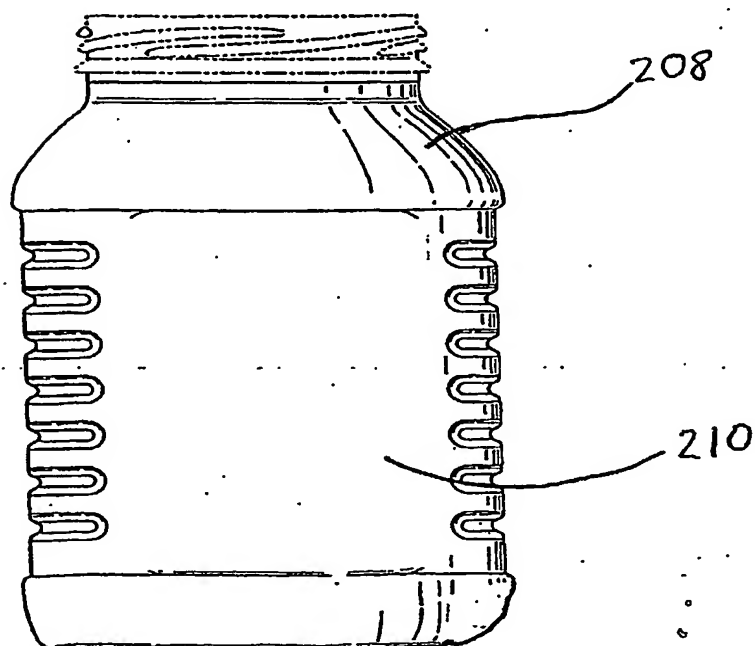


FIG. 2B

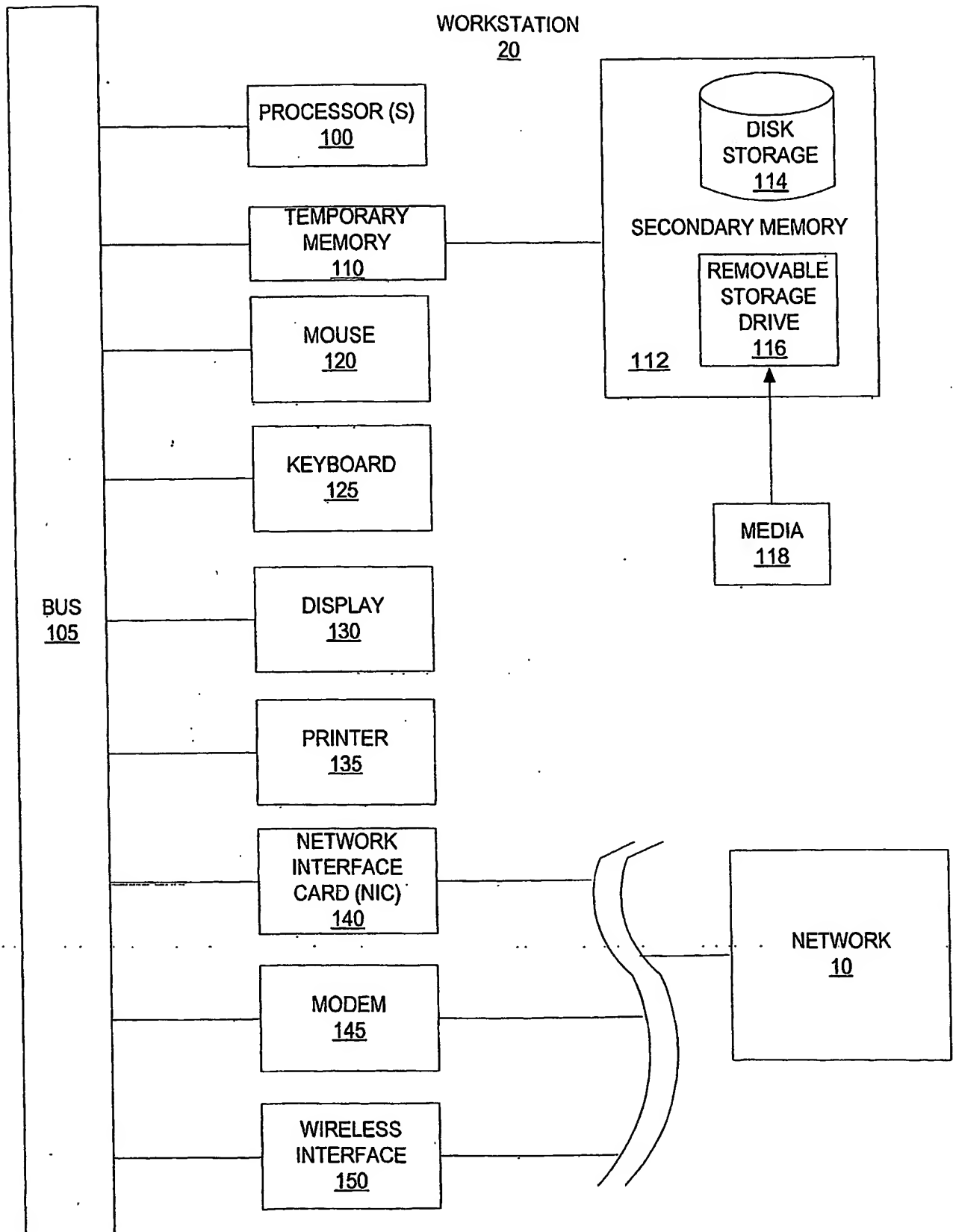


FIG. 3

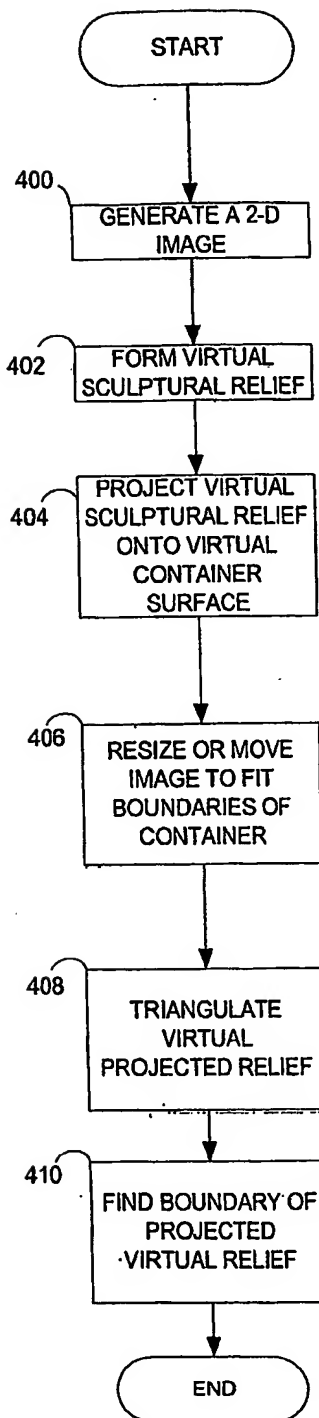


FIG. 4

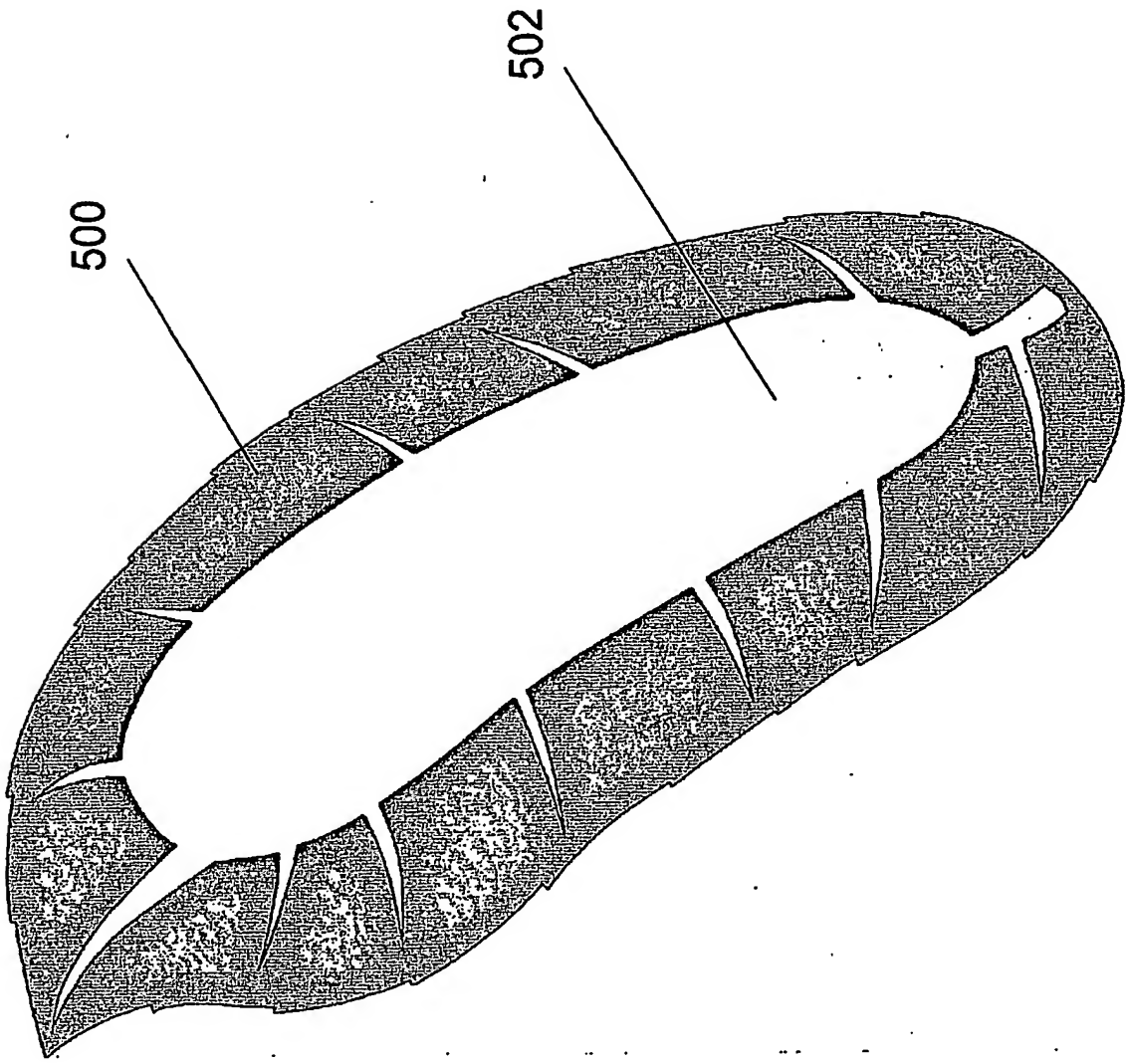
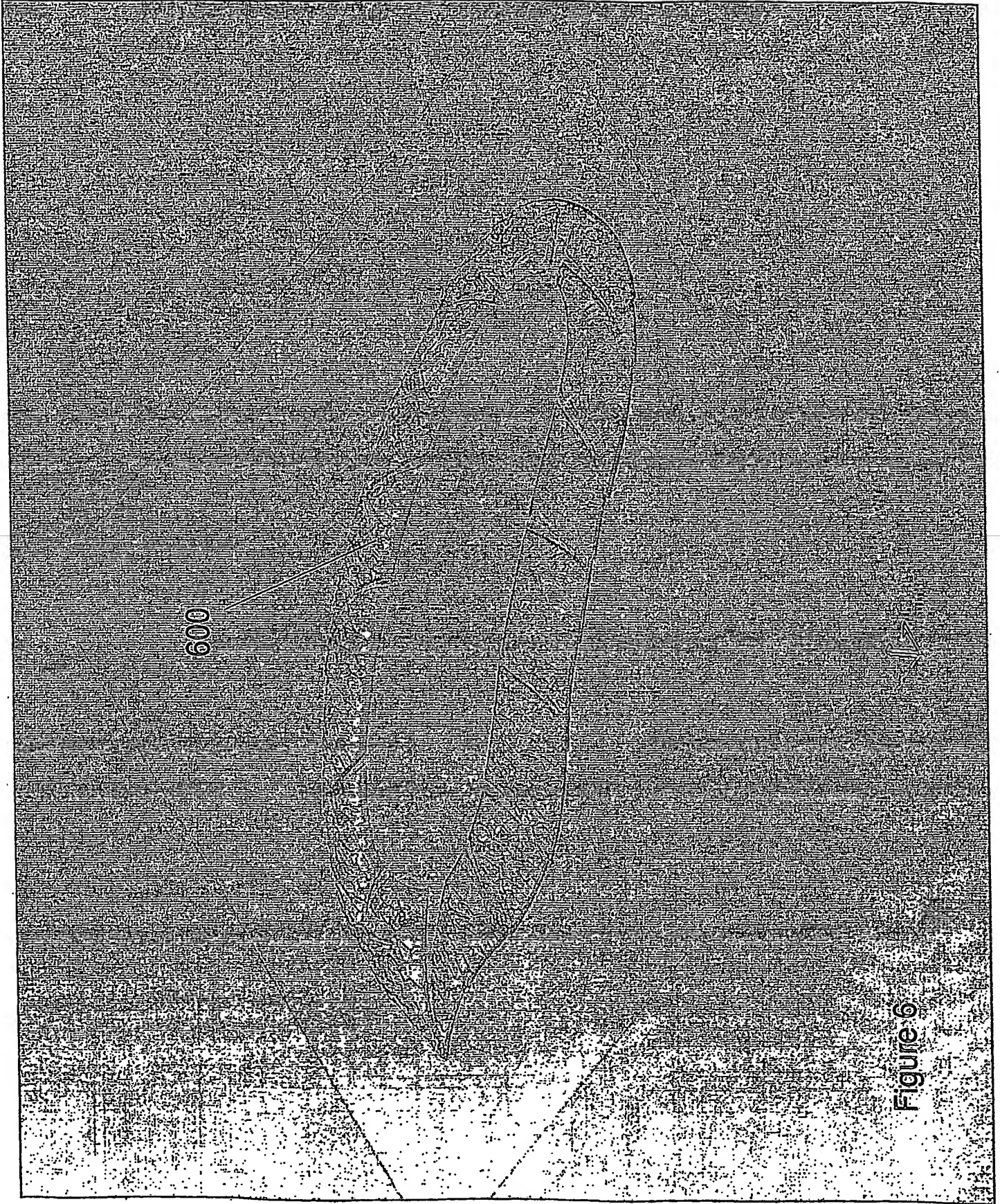


Figure 5

600

Figure 6



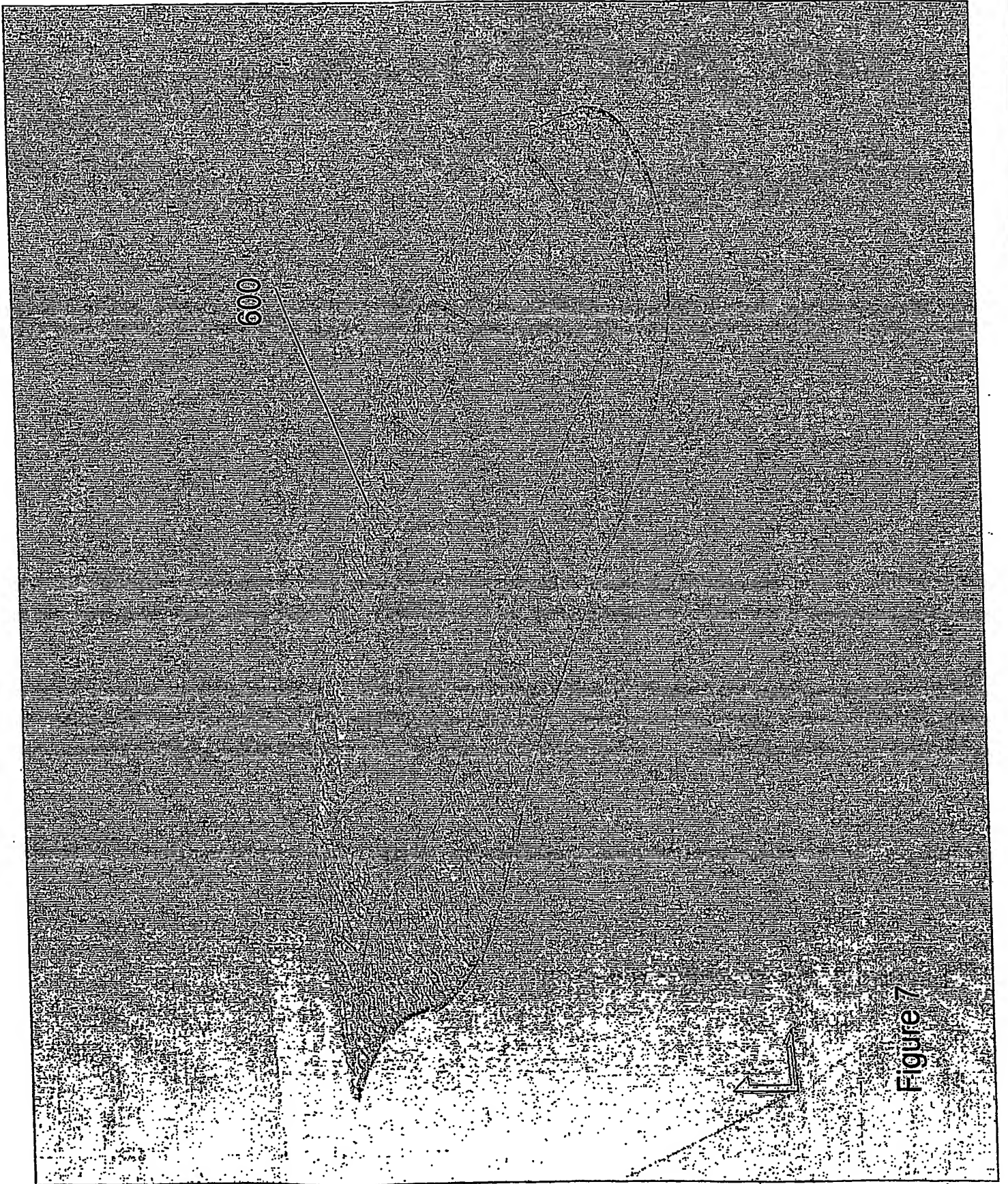


Figure 7

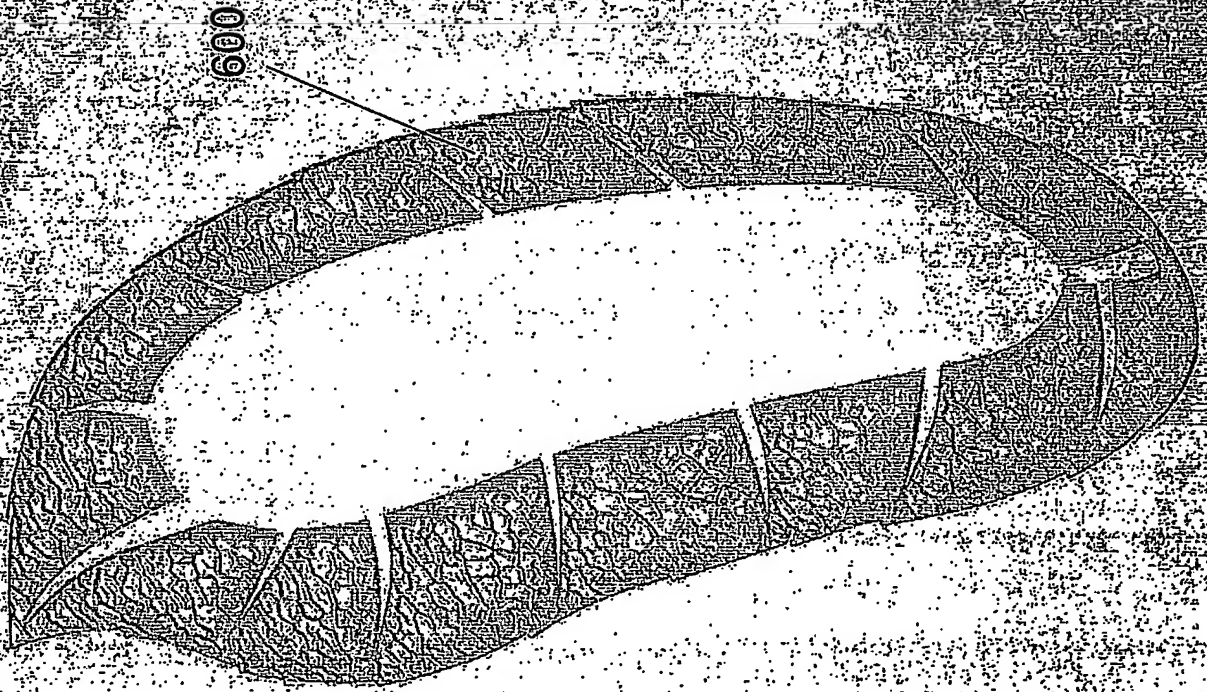


Figure 8

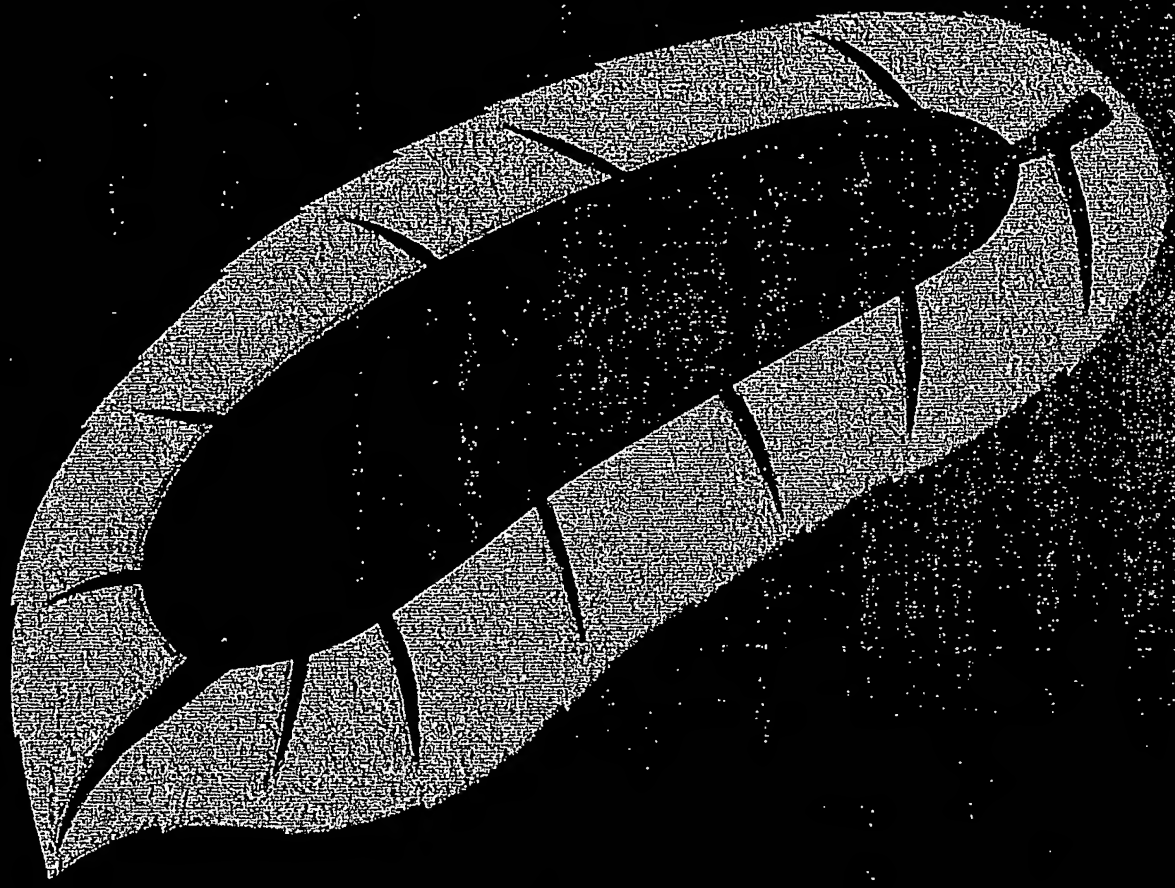


Figure 9

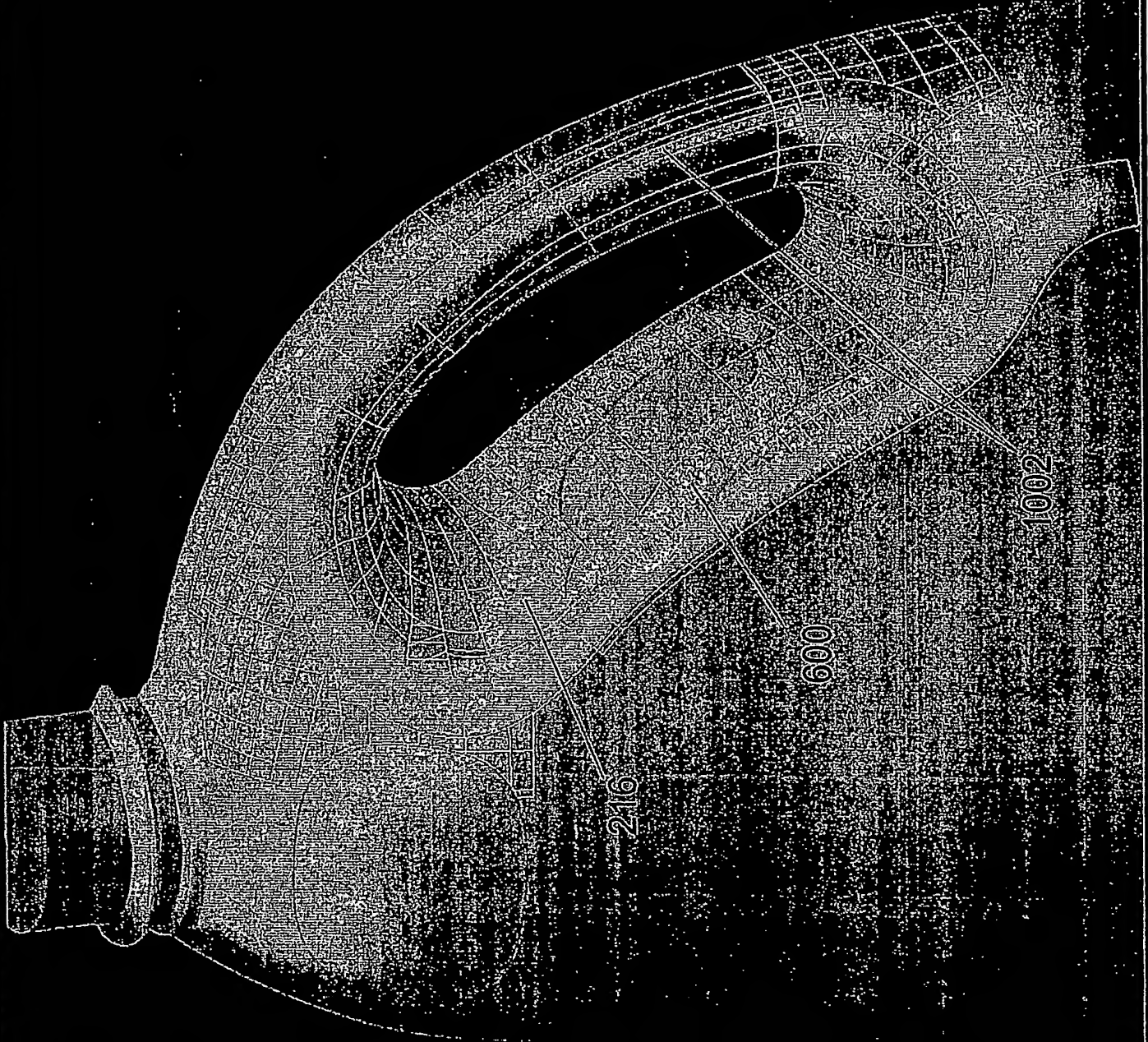


Figure 10

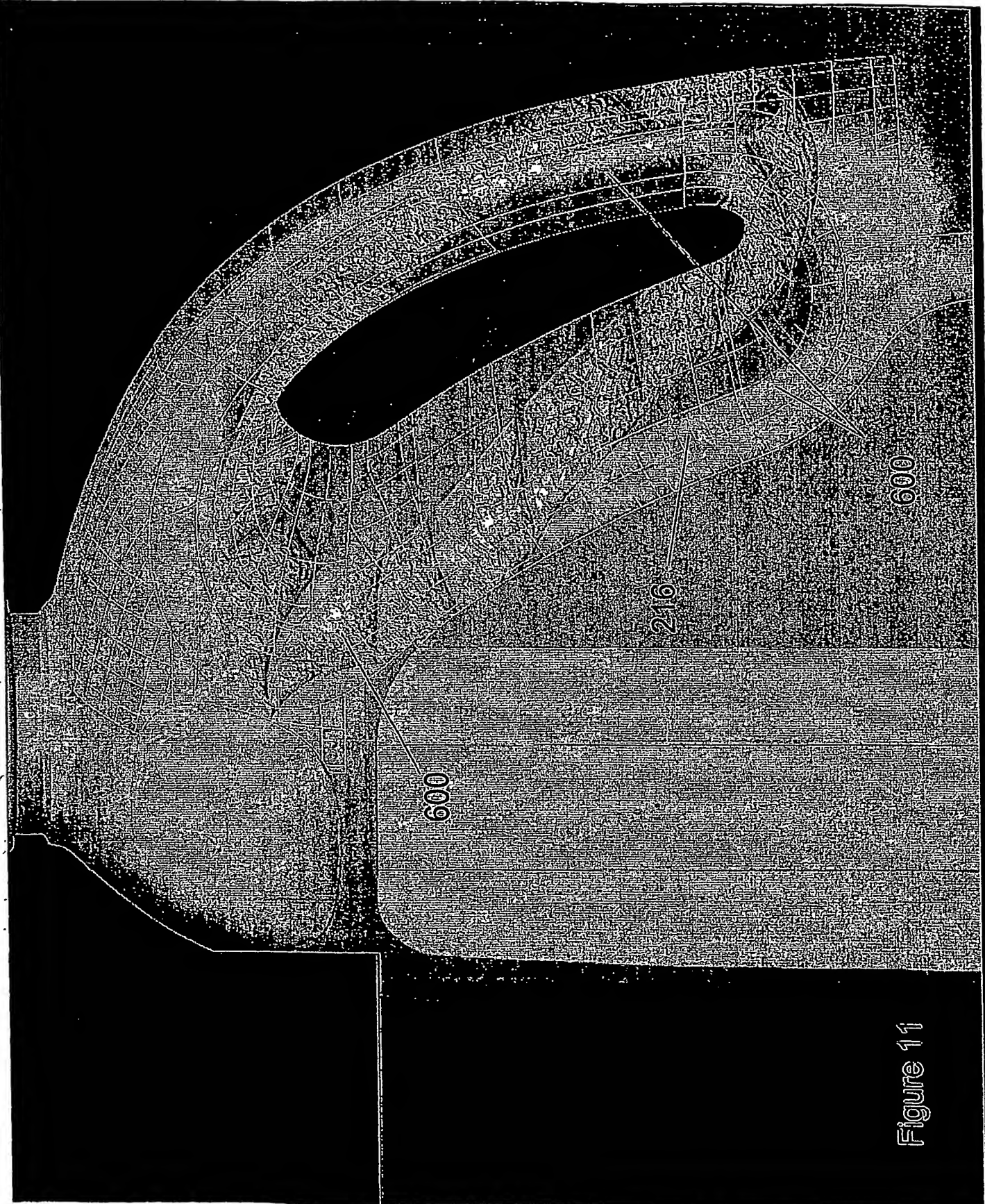


Figure 11

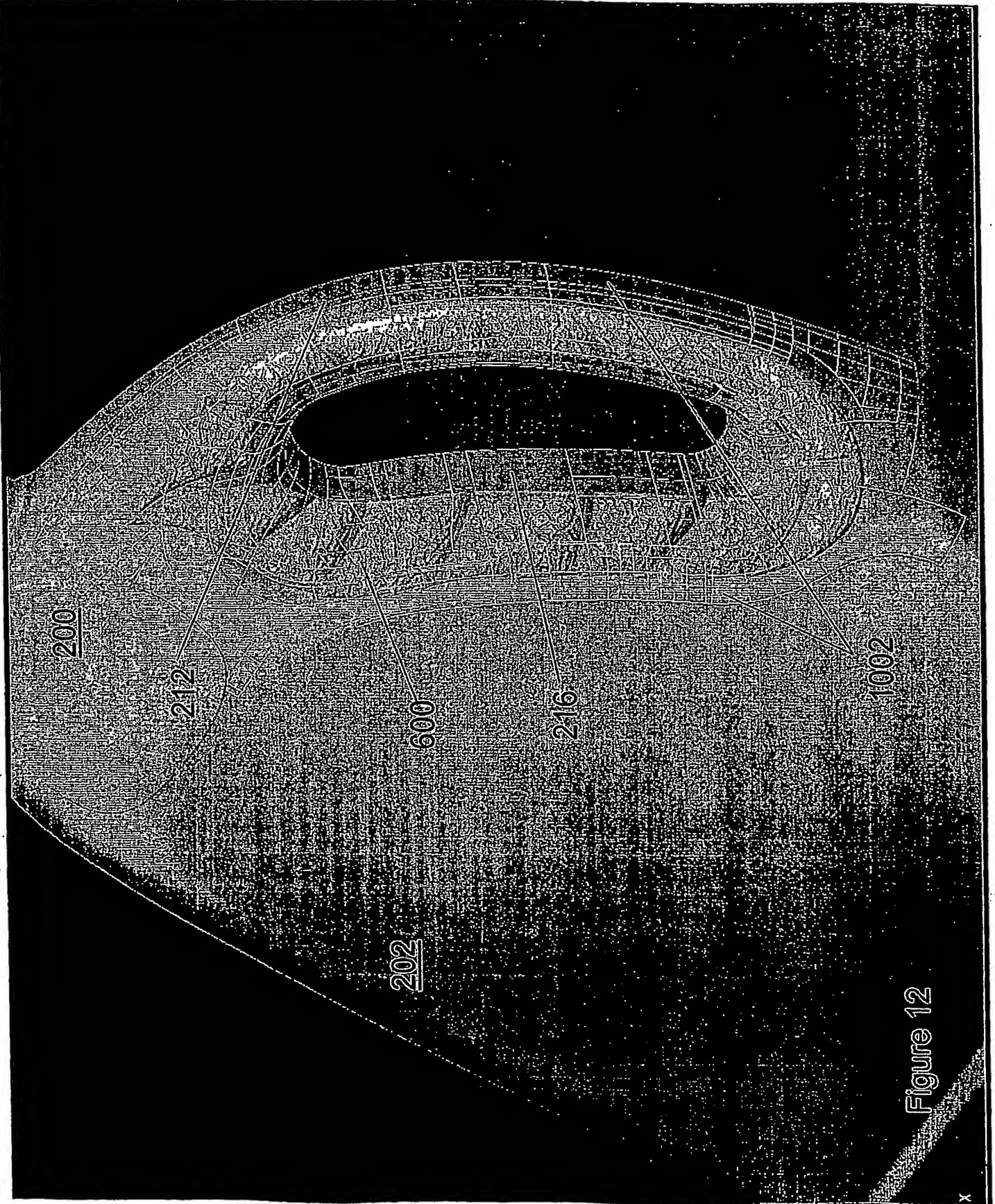


Figure 12

Figure 13

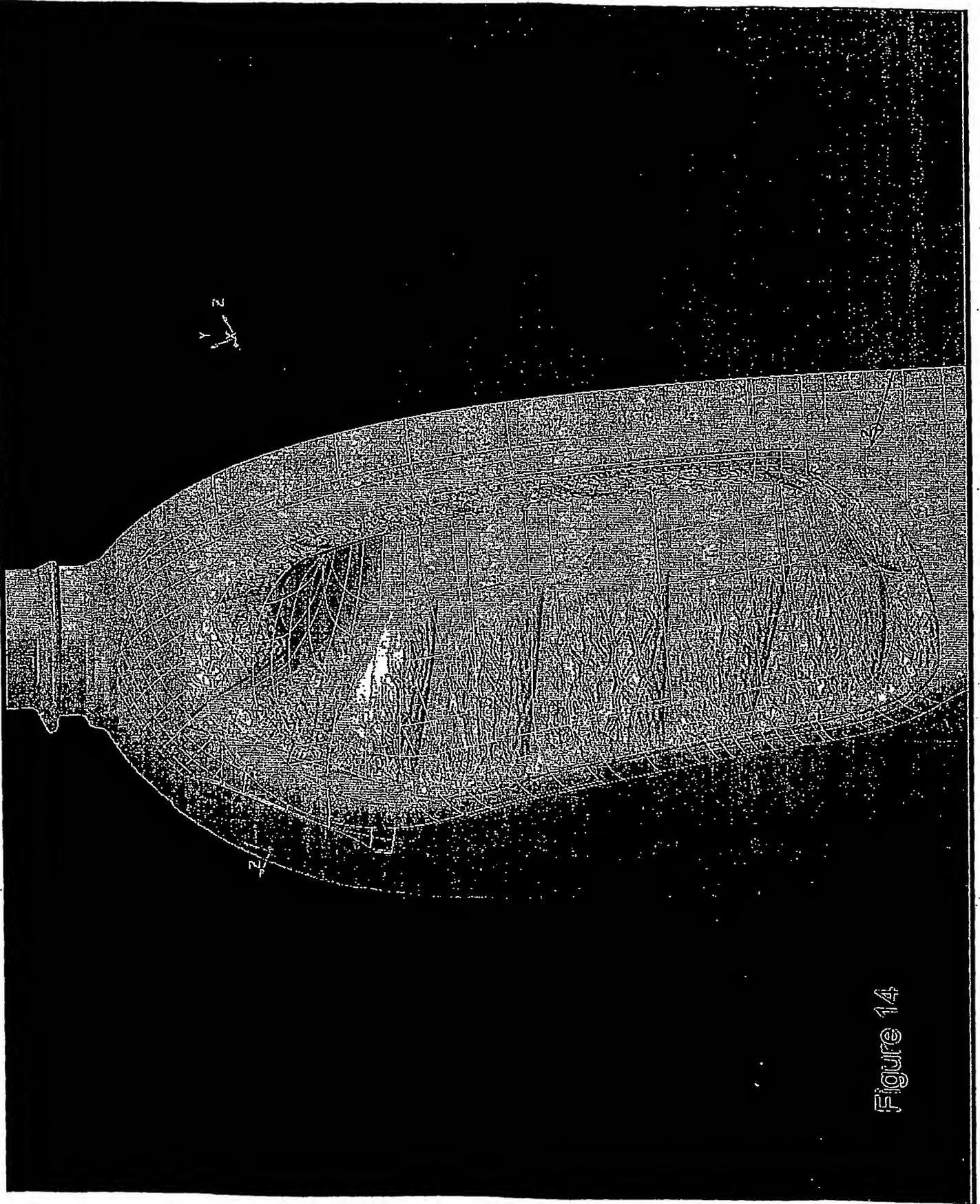


Figure 14



Figure 15



b



a

Figure 16

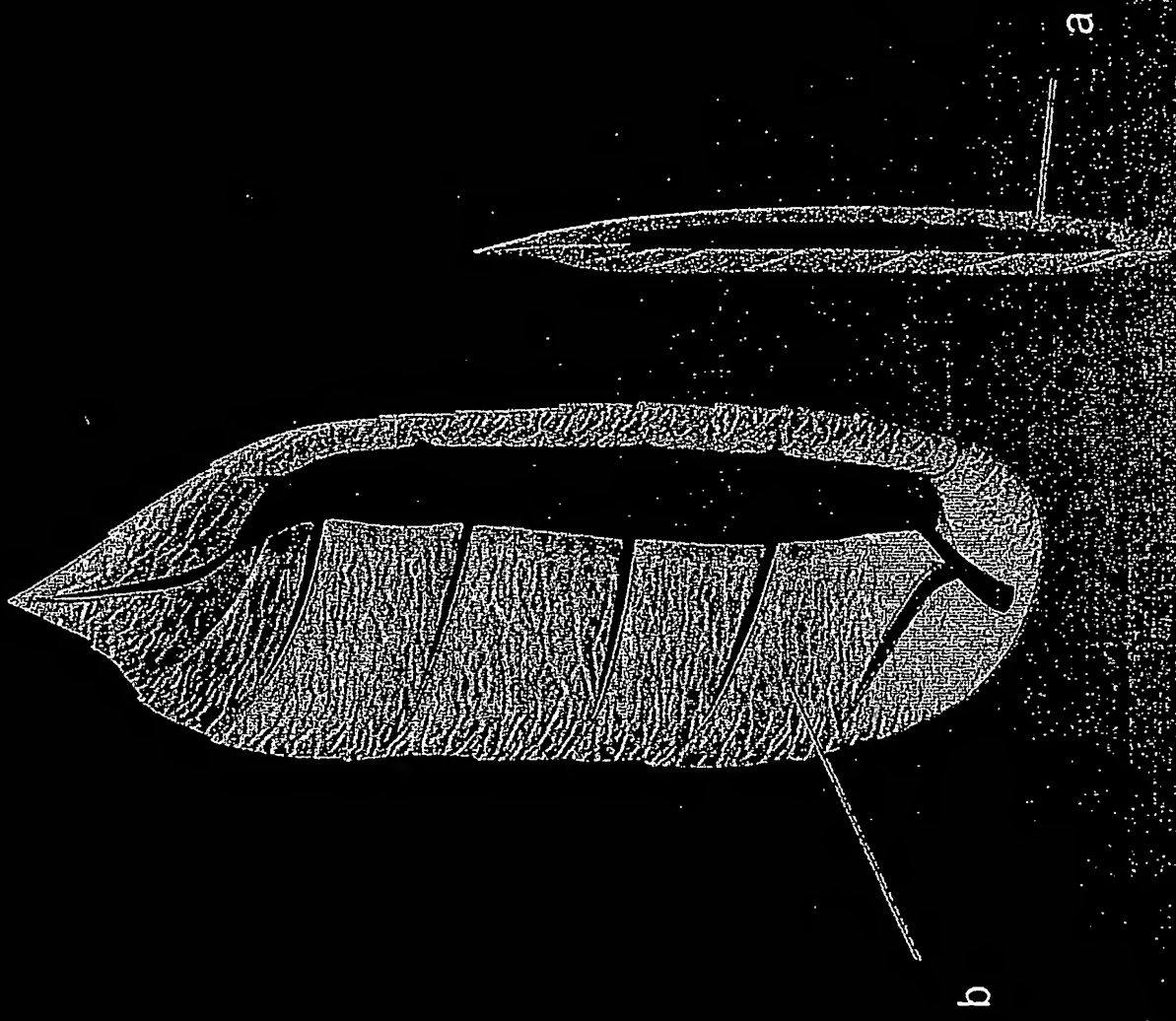


Figure 17

1800

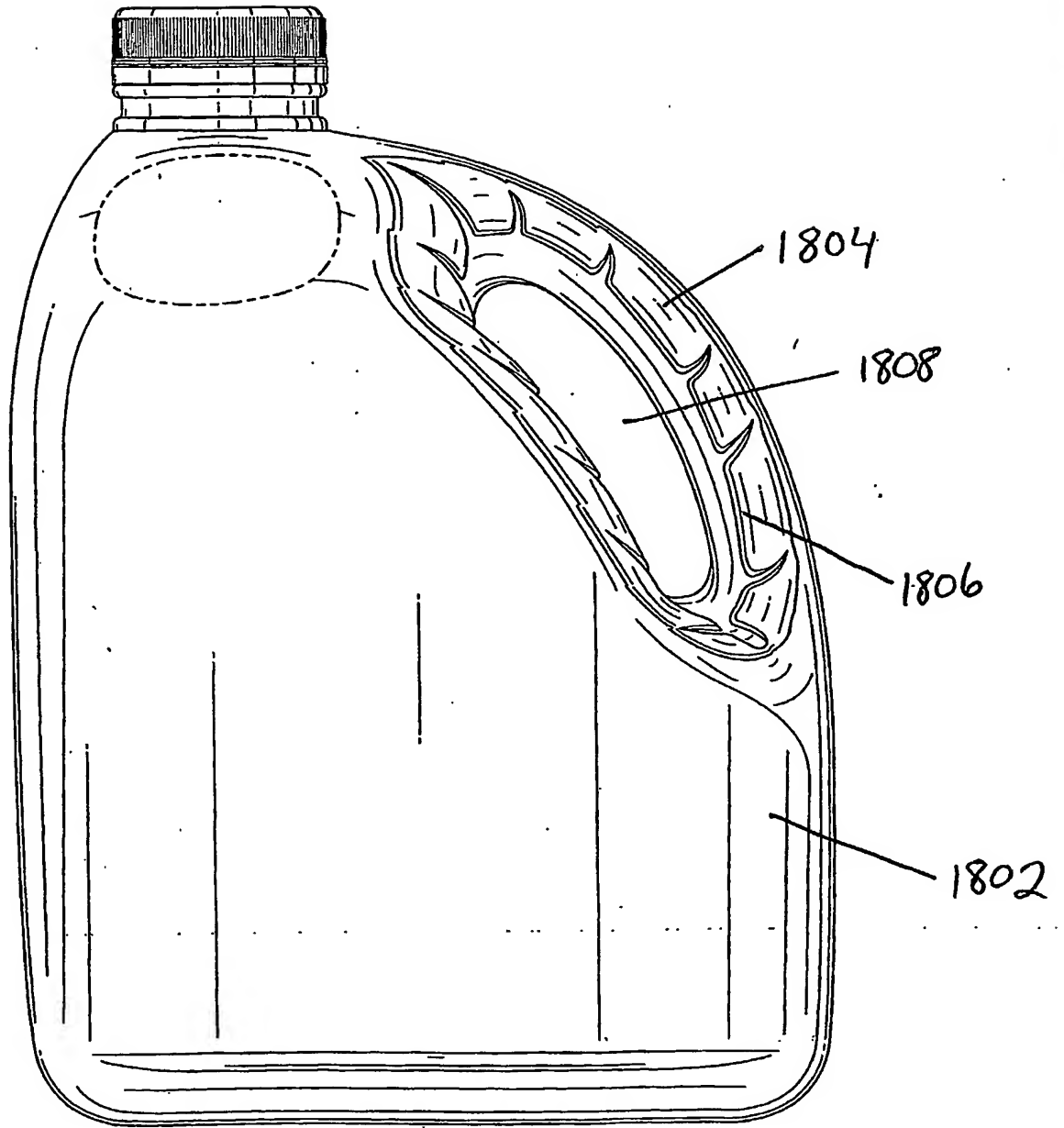
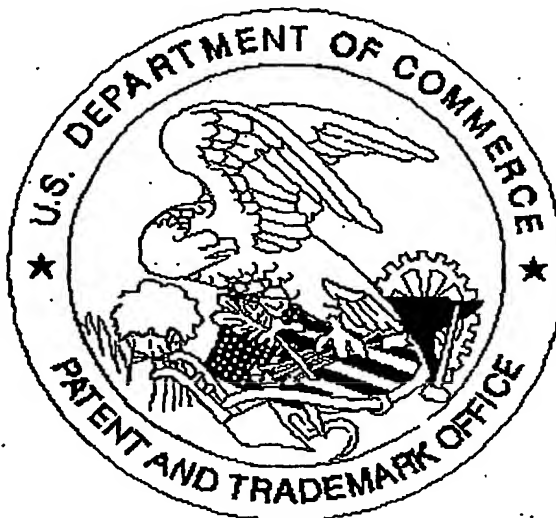


FIG. 18

United States Patent & Trademark Office
Office of Initial Patent Examination -- Scanning Division



Application deficiencies found during scanning:

☐ Page(s) _____ of _____ were not present
for scanning. (Document title)

☐ Page(s) _____ of _____ were not
present
for scanning. (Document title)

☒ Scanned copy is best available.

Drawings are dark

This Page is inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ BLACK BORDERS
- ☒ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURED OR ILLEGIBLE TEXT OR DRAWING
- ☒ SKEWED/SLANTED IMAGES
- ☐ COLORED OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REPERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

**As rescanning documents *will not* correct images
problems checked, please do not report the
problems to the IFW Image Problem Mailbox**